Amendments to the Claims

The listing of the claims will replace all prior versions, and listings, of claims in the application.

Listing of the Claims:

1. (Currently Amended) A surgical operation supporting apparatus comprising:

first acquisition means ~~that~~ for optically ~~measures~~ measuring a surface of an operation site during surgery and that acquires first position information representing a three-dimensional position of each of points on the surface of the operation site;

second acquisition means ~~that~~ for:

~~measures~~ measuring an unexposed portion of the operation site with ultrasonic waves during surgery, the unexposed portion of the operation site being below the surface of the operation site; and ~~that~~

~~acquires~~ acquiring second position information representing a three-dimensional position of each of points in the unexposed portion of the operation site;

correction means ~~that~~ for, based on the first position information acquired by said first acquisition means and the second position information acquired by said second acquisition means, ~~estimates~~ estimating displacement and distortion at each of the points in the operation site using a three-dimensional model generated based on a plurality of high-definition tomographic images of the operation site, which images are taken before surgery, and that corrects the plurality of high-definition tomographic images; and

display control means ~~that~~ for ~~allows~~ allowing the high-definition tomographic images corrected by said correction means to be shown on ~~display means~~ a display.

2. (Previously Presented) The surgical operation supporting apparatus according to claim 1, wherein said first acquisition means comprises a scanning device mounted at a surgical microscope and scanning the surface of the operation site with laser light, and detecting means mounted at the surgical microscope and receiving laser light reflected by the surface of

the operation site, thereby detecting a three-dimensional position of a portion on which the laser light is irradiated, on the surface of the operation site, and an operation of detecting the three-dimensional position by said detecting means is carried out repeatedly while scanning each of the points on the surface of the operation site with laser light, thereby acquiring the first position information.

3. (Previously Presented) The surgical operation supporting apparatus according to claim 1, wherein said first acquisition means further comprises image pickup means mounted at the surgical microscope and producing images of the surface of the operation site, and said correction means is provided so as to estimate displacement and distortion at each of the points in the operation site also using images produced by said image pickup means.

4. (Previously Presented) The surgical operation supporting apparatus according to claim 1, wherein said second acquisition means comprises a probe that transmits ultrasonic waves to the operation site and receives ultrasonic waves reflected by the points in the unexposed portion of the operation site, and conversion means that converts the ultrasonic waves received by the probe to tomographic images, and said second acquisition means is provided so as to acquire the second position information by obtaining the three-dimensional position of each of the points on the ultrasonic tomographic images obtained by said conversion means.

5. (Previously Presented) The surgical operation supporting apparatus according to claim 4, wherein:

said first acquisition means comprises a scanning device mounted at a surgical microscope and scanning the surface of the operation site with laser light and detecting means mounted at the surgical microscope and receiving laser light reflected by the surface of the operation site, thereby detecting a three-dimensional position of a portion on which the laser light is irradiated, on the surface of the operation site, and said first acquisition means also detects the three-dimensional position of the probe of said second acquisition means; and

said second acquisition means obtains, based on the three-dimensional position of the probe detected by said first acquisition means, the three-dimensional position of each of the points on the ultrasonic tomographic image.

6. (Previously Presented) The surgical operation supporting apparatus according to claim 1, wherein the high-definition tomographic image is an MRI image produced by nuclear magnetic resonance-computed tomography.

7. (Previously Presented) The surgical operation supporting apparatus according to claim 1, wherein said correction means corrects, based on the first position information acquired by said first acquisition means and the second position information acquired by said acquisition means, a position of a portion whose three-dimensional position is known by the first position information and the second position information in the three-dimensional model of the operation site, and thereafter, estimates displacement and distortion at a portion whose three-dimensional position is not known in the three-dimensional model of the operation site, by means of a finite element method or a method similar thereto, and based on the estimated result, re-corrects the three-dimensional model of the operation site, and further based on the re-corrected three-dimensional model of the operation site, carries out correction of the plurality of high-definition tomographic images.

8. (Previously Presented) The surgical operation supporting apparatus according to claim 1, wherein when the plurality of high-definition tomographic images are produced before a surgical operation, at least three first marks are applied on the periphery of the operation site, and at the time of the surgical operation, at least three second marks are applied to the vicinities of the operation site;

said first acquisition means further acquires mark position information that represents respective three-dimensional positions of the first marks and the second marks;

said correction means carries out, based on the mark position information acquired by said first acquisition means, and positions of image portions corresponding to the first marks on the high-definition tomographic image, alignment of the

high-definition tomographic image and the first position information and the second position information.

9. (Currently Amended) The surgical operation supporting apparatus according to claim 1, wherein operation of acquiring the first position information by said first acquisition means, acquiring the second position information by said second acquisition means, correcting the plurality of high-definition tomographic images by said correction means, and displaying the high-definition tomographic images by said display ~~means~~ is carried out repeatedly during the surgical operation.

10. (Currently Amended) A surgical operation supporting method comprising:

a first step in which based on a plurality of high-definition tomographic images of an operation site taken as an image before surgery: a three-dimensional model of the operation site is generated;

a second step in which a surface of the operation site is optically measured during surgery, so as to acquire first position information that represents a three-dimensional position of each of points on the surface of the operation site, and an unexposed portion of the operation site is measured with ultrasonic waves during surgery, so as to acquire second position information that represents a three-dimensional position of each of points of the unexposed portion in the operation site, the unexposed portion of the operation site being below the surface of the operation site;

a third step in which based on the first position information and the second position information acquired by said second step, displacement and distortion at each of the points in the operation site are estimated using the three-dimensional model generated by said first step, and in accordance with the estimated displacement and distortion at each of the points in the operation site, the plurality of high-definition tomographic images of the operation site taken as images before surgery are corrected; and

a fourth step in which the high-definition tomographic images corrected by said third step are shown on ~~display means~~ a display.

11. (Currently Amended) A computer readable medium storing surgical operation supporting program that causes a computer, to which a display means is connected, to ~~function as~~ execute a process, the process comprising~~:~~

~~first acquisition means that optically measures~~ measuring a surface of an operation site during surgery ~~and that acquires~~ to acquire first position information representing a three-dimensional position of each of points on the surface of the operation site at a scanning device;

~~second acquisition means that measures~~ measuring an ~~exposed~~ unexposed portion of the operation site with ultrasonic waves generated by a probe during the surgery, the unexposed portion of the operation site being below the surface of the operation site, and ~~that acquires~~ acquiring second position information representing a three-dimensional position at each of points in the unexposed portion of the operation site at ~~a second acquisition means~~ via the probe;

~~correction means that, based on the first position information acquired by said first acquisition means and the second position information acquired by said second acquisition means, estimates~~ estimating at the computer, based on the first position information acquired by the scanning device and the second position information acquired by the probe, the displacement and distortion at each of the points in the operation site using a three-dimensional model generated based on a plurality of high-definition tomographic images obtained before the surgery, and, in accordance with the estimated displacement and distortion occurring at each of the points in the operation site, ~~corrects~~ correcting the plurality of high-definition tomographic images of the operation site, which images are produced before the surgery; and

~~display control means that causes~~ generate at the display means the high-definition tomographic images corrected by said correction means ~~to be shown on display means~~ for display.